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# Judging and Scoring MILK



FARMERS' BULLETIN NO. 2111

UNITED STATES DEPARTMENT OF AGRICULTURE

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## **PREFACE**

Milk is an important food from a nutrition standpoint and a pleasant and satisfying food when it is properly prepared.

The flavor of milk is the key to its popularity as a food. Those who may be working with milk as producers, or in other phases of the dairy industry, should know more of its flavor qualities and other characteristics which are evaluated in judging milk quality.

Training in judging and scoring milk will be of value to anyone who may enter the dairy industry. In connection with such training, student judging contests, held at local, State, and National levels, are very helpful. They not only develop judging skills among the participants, but in bringing together students from different localities, they promote uniformity in judging practices.

Those trained in milk judging, even if they are not directly handling the production of milk, often have the opportunity to advise farmers when flavors or conditions which need correcting are present in the milk. In this way, they may help bring about quality improvement, which is the real purpose of all dairy products scoring.

This pamphlet has been prepared to help train students and beginning judges who want to learn some of the fundamentals of judging milk. It has been written also in the hope that it will help to arouse in many young persons a desire to enter into a fascinating industry which offers unlimited possibilities for diversification or specialization and vocational satisfaction.

Appreciation is expressed to John Lacey, Office of Education, United States Department of Health, Education, and Welfare; and to E. J. Johnson, formerly of the same office, for their helpful suggestions and comments in the preparation of this publication.

# Judging and Scoring Milk

The judging and scoring of milk is important to all phases of the dairy industry—production, processing, and marketing of milk and milk products.

In practice, some phases of milk judging may take place at the farm, but, most judging begins at commercial dairy plants as the milk reaches the receiving platform. Examinations of milk are made often at various points during the processing, to check any irregularities in the operation. Finally, a scoring of the finished product is made by one or more members of the quality control staff of the dairy. Often, a dairy plant will score its milk in comparison with competitors'. Such judging is essential if the plant wishes to maintain a consistently high-quality product.

Training for judging must come from actual work with prepared samples or from experience in a dairy where a wide variety of flavors may be found. A basic understanding of the problems involved in judging and a uniform application of judging procedures is very important.

## FACTORS IN JUDGING AND SCORING MILK

### Distinguishing Flavors and Odors

There are four primary taste sensations—sweet, sour, salt and bitter. Sugar produces the sensation of sweetness; lactic acid or tart apple the sour taste; common salt gives a sensation of saltiness; and quinine produces a bitter reaction. Likewise, there are four fundamental odor sensations—fragrant, sour or acid, burnt, and caprylic or goaty. The flavors encountered in milk may represent any of the above or a blend of the above fundamental flavors and odors.

These taste sensations are detected by the tongue; however, the sense of smell supplements the sense of taste in determining flavor. This is because volatile flavors enter the olfactory passages of the nose from the back of the mouth and throat.

In learning to detect these flavors, you may find useful this table of three suggested concentrations for each of the four basic taste sensations. By repeating the taste panel a few times, you can compare your tasting ability with the ability of others and check your consistency in repeating your previous judgments.

Substance	Grams per—		Percent concentration
	Quart	Liter	
Sugar.....	6.7	7.0	0.7 (strong).
	2.8	3.0	0.3 (medium).
	.94	1.0	0.1 (weak).
Salt.....	2.8	3.0	0.3 (strong).
	1.9	2.0	0.2 (medium).
	.94	1.0	0.1 (weak).
Lactic acid.....	.47	.5	0.05 (strong).
	.28	.3	0.03 (medium).
	.094	.1	0.01 (weak).
Quinine.....	.094	.1	0.01 (strong).
	.047	.05	0.005 (medium).
	.023	.025	0.0025 (weak).

NOTE.—Weaker or stronger solutions than those suggested above may be desirable as the varying abilities of the individual warrant.

## Flavors—Description and Causes

Flavors of milk may be caused, in general, by five factors: Health of the cow, feeds consumed by the cow, bacteriological action, chemical changes, and absorption of foreign flavors after the milk is drawn.

Through extensive research, much has been done to determine the specific causes of common flavors in milk. However, there is need for still more work before definite causes can be reported for all flavors. A number of these flavors are listed here, together with their probable causes based on what we know today. By gaining an understanding of their origin, you will have a better background for identifying and recognizing each of these particular flavors.

**Bitter**—A bitter taste in fresh milk may be caused by (1) strong feeds or weeds that might carry flavor through into the milk, or (2) by conditions present in milk from cows late in the lactation period: For example, stripper cows just prior to the drying-up period. Bitter flavor may also result from certain bacterial growth, but normally this will not occur unless the milk is held several days at low temperatures. Bitter milk is sometimes confused with rancid milk.

**Cooked**—This is a flavor which results from heating milk. It may appear when all or even a portion of the milk has been heated too high or for too long a period. Normally, the higher the heating temperature, the more intense the flavor.

**Coarse (high) acid**—Milk that has developed some acidity as a result of bacterial growth will have an acid flavor long before it may be classified as sour. Milk may have an acid flavor when only a small

part of high acid milk is mixed with low acid milk; yet the total acidity on the entire lot may be within normal range.

**Cowy**—This flavor resembles the odor of a poorly ventilated barn. It may result if milk is not removed quickly from the barn but is more likely to be caused by cows inhaling the air of a barn not regularly cleaned and properly ventilated. Such odors can be inhaled by the cow and pass directly into the milk. The general health of the cow is also a contributing factor in producing milk identified as cowy.

**Disinfectant**—A residue of strong chlorine or other similar solution, if left in containers, is absorbed by milk, imparting a flavor characteristic of the disinfectant.

**Feed**—The feed a cow eats may impart certain flavors to milk. Some of the stronger feeds will carry through more noticeably. Green grass, silage (especially that toward the bottom of the silo), turnips, and alfalfa hay are outstanding examples. However, feed flavor can be minimized or eliminated by taking the cows off such feed 2 to 4 hours before milking. Certain feeds if fed even 15 to 30 minutes before milking time can be detected in the milk. For this reason feeding *after* milking is recommended.

**Flat**—(Watery)—This is an uncommon flavor and its source is difficult to determine. It may be described as tasteless. The characteristic flavor of normal milk is lacking and the milk has no off-flavor. It resembles normal milk that has been diluted partially with water, even though this may not have been done.

**Foreign**—Any seriously objectionable flavor foreign to milk, such as fly spray, paint, oil, kerosene, creosote or a medicinal substance which may have gotten into milk or been absorbed by it, will render the milk unpalatable or unfit for use.

**Malty**—This is not a common flavor but it may be encountered in milk not properly cooled. Certain bacteria from improperly cleaned equipment, especially milking machines, may contaminate the milk and cause the malty flavor, which becomes quite objectionable in extreme intensities.

**Metallic**—Metallic flavor is rough and puckery on the mouth and tongue. It is caused when milk comes into contact with corrodible metal, such as exposed copper on equipment or rusty milk cans or lids. It is very objectionable and may be the cause of further serious defects in certain dairy products, such as butter, when they are held in storage. It may increase in intensity in proportion to the extent of the milk's contact with metal.

**Musty**—This flavor is suggestive of musty or moldy hay. It may be absorbed but is more likely to come from feed or stagnant water consumed by the cow.

**Onion or Garlic**—This is an obnoxious weed flavor and is not classified as one of normal feed flavors described above. It may actually be so objectionable as to render the sample undesirable for use.

## General Distinguishing Characteristics of Off-Flavors In Milk

Cause of off-flavor	General distinguishing characteristics of the off-flavor in the milk
Bacteria growth.....	Unusually high bacteria count: From 1,300,000 to 305,000,000 per ml. (milliliter).
Feed.....	Bacteria count may be low; flavor present when milk is drawn; usually more intense in night's milk; usually present when cows have had access to roughage shortly before milking; odor pronounced.
Absorption: 1. Direct.....  2. Indirect, through cow breathing foul air.	Encountered very rarely; results only after long exposure to very odoriferous atmosphere; odor not present when milk is first drawn.  Bacteria count may be low; odor of milk suggests uncleanness; odor present when milk is first drawn.
Chemical composition of milk.....	Flavor defect is noticeable when the milk is first drawn; milk usually distinctly salty; inherent to individual animal, rarely in mixed milk; defect more likely from animal advanced in lactation or with infected udder.
Processing.....	Pasteurized, "heated" or modified "cooked" flavor. Detectable immediately after processing; usually not very intense; tends to disappear during storage.
Chemical.....	Not present when milk is first drawn or immediately after pasteurization; develops readily at low temperatures—below 40° F. (4.5° C.); bacteria count low. Three types: 1. <i>Rancidity</i> —In raw milk only; bitter, soapy flavor; defect more intense in cream than in milk and more intense in butter than in cream. 2. <i>Oxidized</i> —Chiefly in pasteurized milk; papery; tallowy; odor somewhat like wet cardboard. 3. <i>Activated</i> —In pasteurized milk exposed to light; suggest burnt protein.
Foreign material.....	Defect present in freshly bottled milk; rarely increases in intensity during storage; taints varied; may resemble brine, medicine; paint, fly spray, or any other strong substance with which the milk may have been contaminated.

Source: Judging Dairy Products—Nelson & Trout, Fourth Ed., page 102.



**Oxidized**—This flavor, quite pungent in advanced stages, is definitely objectionable. It is a general term embracing many other flavors which represent various stages of oxidation or partial changes in the fatty portion of milk. "Papery" or cardboard, metallic, sunlight, and tallowy are forms of oxidized flavors with varying degrees of intensity. It is one of the most troublesome milk flavors and you should recognize it easily after you have experienced it in a few samples. Contact with such metals as copper and iron is a contributing factor in its development. It also develops in a sample of milk placed in a glass container and left in the sun for a short time.

**Rancid**—This flavor, resembling that of stale fat, is not encountered in its extreme form in fresh milk. A taste noticeable in fresh milk is sometimes referred to as "lipase" flavor, which is a form of rancidity, induced by the enzyme lipase. This enzyme causes a change in the composition of the milk fat. "Lipase" is closely associated with bitter flavor; but unlike the common bitter flavor, it has an odor resembling spoiled nut meats. It is more noticeable during winter when cows are on dry feed or during the late lactation period. Extreme agitation of warm raw milk in the presence of air, causing foaming, will result in a rancid type flavor within a few hours.

**Salty**—Salty flavor may be present in milk from cows in the late stages of lactation and is often characteristic of milk from cows infected with mastitis. Some cows are more likely than others to produce milk with this flavor during the end of the lactation period. It is not commonly found in herd milk or mixed milk received at a dairy plant.

**Utensil—(Unclean)**—This flavor seldom appears to a pronounced degree in milk. It may result from inadequate washing and sanitizing of cans, pails, or milking machines. It develops from the activity of certain types of bacteria in milk or from the decomposition of material on improperly cleaned equipment which later comes in contact with milk. This flavor could be present as a result of cows drinking unclean water.

**Weedy**—This is not considered among the normal feed flavors. It generally has a bitter characteristic varying with specific weeds of certain localities. It may include obnoxious flavors caused by such plants as ragweed, bitterweed, or peppergrass and may become very troublesome as a flavor defect. It can be eliminated or minimized by keeping the cows away from weed-infested pastures or by not offering feeds containing such weeds until after milking.

## **OBTAINING SUITABLE SAMPLES OF CHARACTERISTIC FLAVORS**

In the process of gaining experience in milk judging, you may not have the opportunity to observe a variety of samples all at the same time. Therefore, suggested methods of preparing special samples to obtain the different flavors are listed below. Intensities may be adjusted by dilu-

tion with good milk after the flavor has been prepared. You should use a high quality pasteurized milk to prepare these special samples:

*Bitter*—add small amount of quinine sulfate.

*Cooked*—heat milk to near boiling temperature.

*Coarse Acid*—add small amount of cultured buttermilk.

*Cow*—This is a difficult flavor to reproduce but it may be done by exposing milk in a poorly ventilated barn for several hours or overnight or by adding a few drops of acetone to the milk sample.

*Disinfectant*—add chlorine or similar sterilizing solution having a distinctive flavor.

*Feed*—add bran, molasses, silage, etc.

*Flat*—add water (distilled, if available).

*Foreign*—add a few drops of kerosene or oil, or expose milk to paint, gasoline, creosote, or fly spray, in a covered container.

*Malty*—add malt flavor.

*Metallic*—place milk in rusty or galvanized container for several hours or overnight.

*Musty*—This is another difficult flavor to duplicate but it may be done by exposing the milk to musty, moldy hay in a covered container or in a damp, musty root cellar.

*Onion*—add a few drops of juice from onion or put piece of onion in milk for short time.

*Oxidized*—add one drop of 1 percent solution of copper sulfate per quart of milk and place sample in sun, or leave piece of bare copper sheeting in warm sample of milk for a few hours.

*Rancid*—add a couple drops of butyric acid per quart of milk or agitate warm raw milk for several minutes vigorously enough to cause foaming, cool and allow to stand several hours. Rancid flavor will develop also if raw milk is mixed with homogenized milk and allowed to stand several hours.

*Salty*—add common salt.

*Unclean*—This is another flavor difficult to reproduce although a mixture of cowy, high acid milk with a small amount of metallic milk may come closest to it.

*Weedy*—This too, may be difficult to duplicate in its true form, but a similar flavor may be obtained by mixing feed flavored milk and bitter milk.

## Factors Affecting a Judge or Grader

Most people can develop a good sense of taste and smell, though some few individuals cannot. Because many flavors are present in such minute concentrations, great skill is often necessary to detect them. A judge, in addition to developing a keen sense of taste and smell, should do all he can to keep himself in the best of health. Illnesses such as the common cold numb the senses of taste and smell and may jeopardize your ability to distinguish one flavor from another. Even slight changes in health

may cause day to day variations in ability and thus prevent accurate judgment.

Accuracy in identifying flavors and odors is very important. You should be able to repeat your decisions on the same or similar samples if your judgments are to be accepted. To do this, you should develop good taste "memory" so that you will recognize quickly any previously encountered flavor and its relative intensity. Many times the result of such judgment may mean thousands of dollars in a financial settlement between the buyer and seller of a dairy product.

A judge, in addition to maintaining good health, should consider certain personal practices. Smoking or using tobacco in any form may cause inconsistencies in judging. The flavor of tobacco may dull the sense of taste and smell and this can make it difficult to detect some of the most delicate flavors and odors. Some smokers have proved to be very good judges, but they are the exception, rather than the rule. If you do use tobacco, you should follow your usual smoking routine, but refrain from smoking for at least an hour before judging. Drastically altering your smoking habits may change your reaction to flavor sensations and prevent proper concentration while judging.

Other distracting factors are strong or heavily scented soaps, shaving lotion, hair oils, or perfumes. While not always noticeable to the user, they are often distracting to another person. Such aromas can completely mask or cover up otherwise noticeable flavors and odors and, therefore, should be avoided when judging.

Avoid eating strong or highly seasoned foods such as onions or chili, or using certain chewing gum just before judging dairy products. Eating a heavy meal before judging will tend to dull the sense of taste and smell. Your senses are keenest when you have eaten only lightly or are slightly hungry.

## **Judging Room and Facilities**

The judging room or area should be clean, orderly, well lighted and ventilated, and free from strong odors, noises or other distracting influences. The temperature should be approximately 75° F.

In student judging contests, however, many people may be crowded together and some unavoidable confusion may exist. For that reason in training for judging contests it may be advisable for you, as a part of your training, to learn to concentrate upon the detection of flavors and odors under similar conditions.

A waste container partially filled with sawdust or absorbent paper, or, preferably, a sink with running water, is necessary. The judge does not swallow any of the product but must spit it out as soon as he has tasted it. Otherwise, he would soon dull his sense of taste or limit his capacity to judge many samples.

An individual cup or container, preferably glass or china, should be used, because a metal cup, unless of stainless steel, might impart a metal-

lic flavor. Some paper cups impart a flavor or odor of paper to their contents. Paper towels are needed for wiping the hands and mouth.

## METHODS OF JUDGING MILK

### Scoring Procedure

There are various standards or methods for measuring the quality of milk. A scorecard was one of the earliest forms used for evaluating and recording quality. On the U. S. Department of Agriculture and other official score cards the various characteristics are evaluated as follows:

	<i>Point<sup>1</sup></i>
Flavor and odor.....	45
Sediment.....	10
Container and closure.....	5
Bacteria <sup>1</sup> .....	35
Temperature <sup>1</sup> .....	5
<hr/>	
Total.....	100

<sup>1</sup> Not considered in the Future Farmers of America National Contest for either milk or cream.

The rating for container and closure may be adapted to the consumer container if pasteurized bottle milk is rated, or to can and cover if bulk milk in cans is scored (see p. 16). Scoring cans and covers is valuable as a guide in establishing routine examinations at dairy receiving platforms. However, cans are rapidly being replaced by bulk tanks, but the importance of clean cans cannot be overlooked as long as they are used at any time as milk containers. Most dairies conduct examinations regularly and reject cans that are unfit for use or might affect the quality of milk. At the plant, bulk milk is rated upon flavor and odor, sediment, bacteria, and temperature.

Samples are best judged or scored with only number identification because knowing the brand or source of the sample may prejudice the judge.

### Judging the Samples

Before attempting to score milk samples for the first time, you should work with a trained judge or coach and learn to recognize and identify the various flavors that you may encounter.

This is the usual procedure for identifying a flavor:

1. Put a warmed sample ( $\frac{1}{4}$  to  $\frac{1}{2}$  cup or 2-3 ounces) of milk into a glass or cup. If possible, before the sample is poured, quickly note the odor from the bottle or container; otherwise the odor may soon be lost.

2. Take a small sip, and with the mouth closed, not swallowing any of the milk, move your tongue moderately five or six times, at the same time exhaling slowly through the nose. This forces the aroma through the back of the nose, making it possible to note the aroma and taste.

3. Spit out the sample quickly and identify the aftertaste. Hold the sample in your mouth no longer than about 10 seconds. Nothing is gained by holding it longer.

4. If necessary, repeat the procedure as a further check on your findings. Sometimes it may be necessary to go on to the next sample and come back later for a recheck. However, in order to avoid confusion and develop more confidence in your first decision, do not recheck samples any more than is necessary.

It is advisable to allow a short interval of time between tasting samples, especially after tasting the more harsh and objectionable flavors. This interval will allow your saliva to refreshen your mouth. Sometimes rinsing your mouth with water is helpful, but this usually is not necessary.

After a few trials under the leadership of a capable coach or judge, you can begin to recognize typical flavors and consider their intensities and ratings. From then on, you need continued practice in examining many samples in order to become a well trained and accomplished judge.

## **Flavor and Odor**

Consumer acceptance of milk depends largely upon a pleasing flavor. On the scorecard a total rating of 45 points is allotted to flavor and odor, the most important factors. All of the factors scored, however, may ultimately have a direct or indirect bearing upon flavor. For instance, if the bacteria count is high, certain flavors (sour, bitter, and others) may develop.

Before tasting a milk sample, you should note the odor or aroma. Smell the open container of milk, rather than the individual cup, since the greater volume in the bottle makes it easier to detect the odor. In contests, of course, it may not be possible for each contestant to follow this procedure.

Frequently, the odor or aroma alone is sufficient to classify milk properly. Tasting then is only a matter of further substantiating the flavor found by the aroma. Some flavors, however, are not fully volatile, except in extreme concentration, and therefore may be detected only by taste. Odor plays a very important part in quality determination at a dairy receiving platform where the cans or transport tanks of milk are opened and the aroma noted before they are emptied. The same is true when examining milk in a bulk tank at the farms. The odor should be quickly noted when first raising the lid of the tank.

Because all flavors become more volatile at higher temperatures, you should warm the samples carefully to about 75° to 80° F. prior to examination. A cold sample (below 50° F.) would chill your mouth and make it difficult for you to distinguish certain flavors.

The natural flavor of milk as the "ideal" should be firmly fixed in mind for mental comparison. This mental image will be helpful in distinguishing between samples which show varying characteristics and types of flavor. Each sample should be scored on its own merits, in

comparison with the "ideal". However, you should guard against being too critical because you may imagine flavors that are not there. You should depend on your own judgment and not be influenced by the comments or facial expressions of others. They may be misleading.

Certain feed flavors are usually present and, if only slight, are not seriously criticized. Most of them can be easily detected and nearly all can be prevented. For that reason they should be identified and corrected as soon as possible by those who have control of the production. Some feeds containing weeds, or feeds imparting strong flavors, such as silage, are undesirable. The flavors from such feeds are observed and identified in accordance with their degree of intensity. Wild onion is perhaps the most objectionable of the weed flavors and will render any lot of milk unsuitable for beverage purposes or for any dairy product of high quality. Fresh grass during early spring and summer may be the cause of a milk flavor which is scored down.

More objectionable flavors, such as metallic, oxidized, and rancid-type, can be readily recognized, also, and of course are scored down accordingly.

Other flavors may be absorbed by close association with certain vegetables, fruits, or chemicals such as fly spray and disinfectants. These objectionable flavors should be quickly recognized.

You should study the description of flavors and their causes as outlined on the previous pages.

The scorecard does not list all the flavors that may be found and

### Suggested Scores for Flavors at Different Intensities

Defect	Intensity		
	Slight	Definite	Pronounced
Bitter . . . . .	34-37	29-33	25-28
Cooked . . . . .	38-40	36-38	33-35
Coarse acid (high acid) . . . . .	35-38	32-34	25-31
Cowy (barny) . . . . .	35-37	32-34	26-31
Disinfectant . . . . .	34-35	28-33	20-27
Feed . . . . .	38-40	35-37	30-34
Flat (watery) . . . . .	38-40	37-38	35-36
Malty . . . . .	34-36	29-33	24-29
Metallic . . . . .	34-36	30-33	25-30
Musty . . . . .	33-35	30-33	25-30
Onion . . . . .	33-35	30-32	25-30
Oxidized . . . . .	34-37	30-33	25-30
Rancid (lipase) . . . . .	32-34	30-32	25-30
Salty . . . . .	36-38	33-35	30-33
Utensil (unclean) . . . . .	34-36	31-34	24-30
Weedy . . . . .	34-37	29-33	24-29

No criticism—40 and above.

NOTE.—Normal score on flavor and odor—25 through 39 (foreign and sour usually score from 0 to 25).

sometimes you may have to write in certain flavors. In FFA contests the participants are required to know only the listed flavors, shown in the current Bulletin No. 4 published by the Future Farmers of America in cooperation with the U.S. Department of Health, Education, and Welfare.

Some samples may reveal more than one flavor. In such cases, the additional flavors may be noted, but usually only the flavor carrying the lowest rating is recorded and scored.

In the table on page 13 the various flavors are listed at three intensities and ratings are suggested for each, within the range of the 45 points allotted for flavor on the scorecard.

### Classification by Score

Score:	Classification
39-42 .....	Excellent.
37-39 .....	Good.
34-37 .....	Fair.
25-34 .....	Poor.
Below 25 .....	Very poor.

## Sediment

Because milk is often exposed to the open air or to other sources of contamination, sediment is sometimes present in spite of every effort to keep it out. Sediment in bottled milk is uncommon, but varying amounts may be noted in bulk milk as it is received by the milk plant.

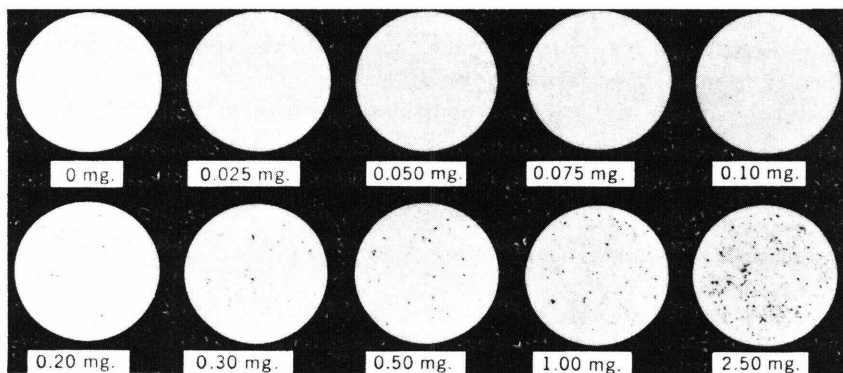


Figure 1

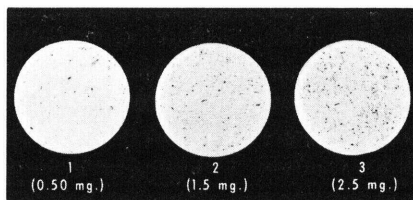


Figure 2

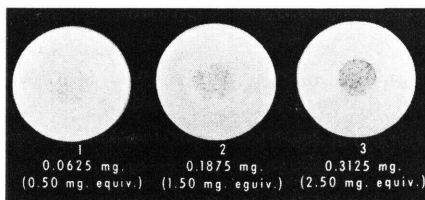


Figure 3

United States Department of Agriculture sediment standards for milk and milk products.

The sediment content of milk is scored by using the charts shown in figures <sup>1</sup>1, 2, and 3. A uniform quantity of milk (1 pint) from each sample is forced through a 1½-inch diameter cotton filter disc, made especially for the purpose, fitted into a specially constructed sediment tester.

For bulk milk in cans, this pint of milk is taken from the bottom of an unstirred can by the use of the special sediment tester. The disc is then compared with the standard discs in figures 1 or 2 and the relative score allotted to the sample. Using the charts in figure 1, the discs showing 0.0 mg. (milligrams) of sediment are scored 10; 0.10 mg., 9; 0.20 mg., 8; 0.30 mg., 7; 0.50 mg., 5; 1.0 mg., 4; 2.5 mg., 1; and in excess of 2.50 mg., 0. Samples are scored only by whole points, according to comparison with the standard disc most closely matching. Using the charts in figure 2, the discs may be scored as follows: 0. mg., 10; more than 0. mg., but not more than 0.5 mg., 5; more than 0.5 mg. but not more than 1.5 mg., 3; more than 1.5 mg. but not more than 2.5 mg., 1; more than 2.5 mg. 0.

For bulk milk in farm tanks, a pint sample is taken of the well-mixed milk in the tank and run through a special sediment tester fitted with a small orifice measuring 0.4 inch in diameter. The cotton disc is then compared with the photographs of USDA Standards shown in figure 3. If scoring is desired, the following ratings may be followed: 0. mg., 10; more than 0. mg., but not more than 0.5 mg., equiv., 5; more than 0.5 mg. equiv. but not more than 1.5 mg., equiv., 3; more than 1.5 mg., equiv. but not more than 2.5 mg. equiv., 1; more than 2.5 mg. equiv., 0.

For bottled milk, a pint sample is stirred thoroughly and poured into a laboratory-type sediment tester. This disc is then compared with the standard discs in figure 1 in the same manner as described above except that the discs are scored as follows: The discs showing 0.0 mg. of sediment are scored 10; the discs showing 0.025 mg., 9; 0.50 mg., 8. Score quarter points between 8 and 9.5 and one-tenth points between 9.5 and 10.

## Container and Closure

This phase of the scorecard is becoming less important as more and more bottled milk is packaged under Grade A requirements, with cover caps, or packaged in paper bottles. However, some weaknesses continue to exist in the consumer containers and should be considered in scoring bottled samples. Scoring cans and covers is also becoming less important at the farm level in those areas where bulk farm tanks have replaced cans and milk is transported in tank trucks to the dairy plants. In the

NOTE.—Normal score on sediment (bulk milk) 4 through 9. Normal score on sediment (bottle milk) 9 through 10.

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<sup>1</sup> Figures 2 and 3 are the charts most commonly used by industry and regulatory officials for checking raw milk quality. These 3 figures (charts) are published as separate U.S. Sediment Standards for Milk and Milk Products. (7 CFR, Part 58, Subpart T.)



more sparsely populated dairy sections, however, cans continue to be used and will be important for many years.

Either the can and cover ratings or the bottle and cap ratings shown below may be placed on the scorecard (see p. 21).

This portion of the rating is merely a matter of close observation or comparison, and with proper coaching and practice, you should have no difficulty in making uniform scorings.

Given below are the various conditions which may be found and the points to be deducted for each defect. A total of 5 points is allotted for container and closure.

### Can and Cover <sup>2</sup>

Can or cover—dirty on inside.....	0.5
Can or cover—open seams.....	.5
Can—milkstone on inner surface.....	.5
Can or cover—rusty on inside.....	.5
Can—wet or moist on inside.....	.5
Can—leaky.....	.5
Can—dented badly to hinder cleaning or flaked-off tin.....	.5
Cover—nonwaterproof (lid with hole in it).....	.5
Cover—plug type (umbrella type gets full credit).....	.5
Cover—poorly seated.....	.5

A combination of undesirable factors may score the can and cover zero. Lid, if cover-link hole is located on overhang, is considered waterproof. The contestant will score each item and place check mark to the right of the defect.

NOTE.—Normal score on can and cover—3 through 4.

### Bottle and Cap <sup>2</sup>

Container closure unsealed.....	0.25
Container not full.....	.5
Container dirty on the inside.....	1.0
Container dented, crushed, bulged or soggy.....	.25
Container leaky.....	1.0
Closure poorly seated or leaky (if uncovered).....	.5
Lip chipped.....	.25
Lip unprotected.....	1.0
Lip partly protected.....	.5
Lip cover not waterproof.....	.5
Torn closure cover (not waterproof).....	.5

When paper containers or dummies are used, they shall be considered as full. The contestant will score each item and check criticisms in the space provided. Normal range of score is given below, but this should not be interpreted to mean that all samples in the contest will be scored within this range.

NOTE.—Normal range 3 through 5.

<sup>2</sup> Neither bottle and cap nor can and cover scoring used in FFA National Contest.

## Bacteria <sup>3</sup>

You will need to make adjustments when considering bacteria ratings, depending on whether you are scoring bottled (pasteurized) or bulk milk (raw milk from the farm). The relative ratings for the various bacteria plate counts for bottled pasteurized milk and raw milk for pasteurization are shown on the back of the printed scorecard (p. 20). For instance, raw milk for pasteurizing purposes would score 0 with a 100,000 plate count, as compared to a 0 score for bottled milk with a 20,000 plate count.

In contest scoring, the judge will make these ratings from information supplied by a laboratory. If the information is not available, he will give a perfect score of 35 points on this item, in order to complete the total score.

It should be kept in mind that the bacterial plate counts on which the scores are arbitrarily given are only estimates, in the sense that the method does not measure exactly all the bacteria present, by a specific figure. Therefore, if you were to score one sample a few tenths of a point higher or lower because of minor differences in the bacterial count, you would not always be scoring realistically. For this reason many contests do not include bacterial counts in the scoring. However, the results of several scorings of samples from the same source are valuable as a guide to the general quality of the milk.

## Temperature <sup>4</sup>

Temperature scoring has been given less attention in recent years because mechanical refrigeration is being used more and more on delivery trucks for bottled milk and on farms for bulk milk. However, since low temperatures are important in the keeping quality of milk, the comparative scores as shown on the card are used for rating each sample. A suggested schedule for rating temperatures for either bulk or bottled milk is as follows:

40° F. or lower.....	5	51°-55°.....	2
41°-45°.....	4	56°-60°.....	1
46°-50°.....	3	Over 60°.....	0

As in the case of bacteria, the temperature factor is usually not judged in contest scoring. When used, the temperatures are either supplied by the person in charge of the contest, or a perfect score of 5 is given to all samples.

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<sup>3</sup> Bacterial counts are not considered in the FFA National Contest, but bacteria do affect flavor and odor.

<sup>4</sup> Not used in FFA National Contest.

## Final Scoring

After flavor and odor, sediment, container and closure (can and cover or bottle and cap), bacteria, and temperature have been rated for a sample, the total score is added for all the factors. This total becomes the score for that sample.

When you have scored several samples and listed the ratings on the contest scorecard, you may compare the totals and make placings.

Sometimes it may be desirable to check the top rated three or four samples a second time, if you have the opportunity, to make sure the first rating and placing was correct. This practice is often not possible in contest judging where large numbers of individuals are involved.

When you are satisfied that the samples are properly scored to the best of your ability, date and sign your card and record such other identifying information as is desirable or required. The card then may become a permanent record for that sample and can serve for comparison at future scorings of milk from the same source or in a competitive scoring contest. In the latter case, the scores will be compared with those of the official judges. From these comparisons the winner is decided.

On page 23 a scorecard used in the National Milk or Cream Scoring Contest by the Future Farmers of America is shown. This scorecard shows the use of milking head unit scoring in contrast to the contest scorecard shown on page 21 which uses bottle and cap scoring.

It might be pointed out here that there are certain weaknesses in the scorecard method of rating a particular supply or source of milk on the basis of one sample. In contrast to contest judging, scoring a sample in order to evaluate the quality of an entire lot of milk involves making certain that the sample used is truly representative of the lot. When the ratings for each of the divisions of the scorecard are totaled into a final figure there may be a question as to whether or not this figure is applicable to the entire lot, in all respects. For instance, the flavor score may fully represent the balance of the lot, whereas the score on the container portion or the temperature portion may not fully represent the balance of the lot. In such a case, the total score may represent only that particular sample, at that particular time.

If there is a question as to whether or not any one sample is fully representative of the lot from which it was taken, it is wise to take a number of samples or take into consideration several scorings over a period of time before placing too much emphasis on a single total score as a means of evaluating a given milk supply.

SCORE CARD SAMPLES

Score Card for Milk or Cream

Place.....

Class.....Exhibit No.....

	PERFECT SCORE	SCORE ALLOWED	REMARKS
Flavor and odor.....	45	.....	{ "Flavor defects" } { listed on other side } .....
Bacteria.....	35	.....	{ Bacteria found } { per milliliter } .....
Sediment.....	10	.....	.....
Temperature.....	5	.....	Degrees.....
Container and closure....	5	.....	{ Container.....
			{ Closure.....
Total.....	100	.....	

Exhibitor.....

Address.....

(Signed) .....

.....

.....

Judges.

Date.....

FIGURE 4.—Scorcard for milk and cream. Reverse side on page 20.

# Directions for Scoring

## Flavor and Odor—Perfect Score, 45

Deductions for disagreeable or foreign odor or flavor should be made according to conditions found. When possible to recognize the cause, it should be described under "Remarks." The following may be used as a guide in scoring flavor:

Excellent: 40 and above; no criticism.

Good: 37 to 40; lacking special high flavor, flat, very slight feed, slight cooked.

Fair: 34 to 37; cooked, feed, salty, slight cowy, slight oxidized.

Poor: 25 to 34; strong feed, weedy, bitter, strong, musty, cowy, oxidized, very slight rancid.

Bad: 25 and below; rancid, strong cowy, high acid.

0; sour, putrid, or any flavor sufficiently strong to render the milk unfit for market purposes

## BACTERIA PER MILLILITER—PERFECT SCORE, 35

Raw milk for pasteurization:

POINTS		POINTS		POINTS	
Under 5,000.....	35	14,100-15,000.....	33.1	24,100-25,000.....	31.1
5,100-6,000.....	34.9	15,100-16,000.....	32.9	25,100-30,000.....	30.0
6,100-7,000.....	34.7	16,100-17,000.....	32.7	31,000-35,000.....	29.0
7,100-8,000.....	34.5	17,100-18,000.....	32.5	36,000-40,000.....	28.0
8,100-9,000.....	34.3	18,100-19,000.....	32.3	41,000-50,000.....	25.0
9,100-10,000.....	34.1	19,100-20,000.....	32.1	51,000-60,000.....	20.0
10,100-11,000.....	33.9	20,100-21,000.....	31.9	61,000-70,000.....	15.0
11,100-12,000.....	33.7	21,100-22,000.....	31.7	71,000-80,000.....	10.0
12,100-13,000.....	33.5	22,100-23,000.....	31.5	81,000-90,000.....	5.0
13,100-14,000.....	33.3	23,100-24,000.....	31.3	91,000-100,000.....	3.0
				Over 100,000.....	0

Pasteurized Milk:

POINTS		POINTS		POINTS	
500 and under.....	35.0	4,600-5,000.....	34.1	12,100-13,000.....	19
510-1,000.....	34.9	5,100-6,000.....	33	13,100-14,000.....	17
1,010-1,500.....	34.8	6,100-7,000.....	31	14,100-15,000.....	15
1,510-2,000.....	34.7	7,100-8,000.....	29	15,100-16,000.....	13
2,010-3,000.....	34.5	8,100-9,000.....	27	16,100-17,000.....	11
3,100-3,500.....	34.4	9,100-10,000.....	25	17,100-18,000.....	9
3,600-4,000.....	34.3	10,100-11,000.....	23	18,100-19,000.....	7
4,100-4,500.....	34.2	11,100-12,000.....	21	19,100-20,000.....	5
				Over 20,000.....	0

## SEDIMENT—PERFECT SCORE, 10

Examination for sediment shall be made by means of a sediment tester, and the resulting cotton discs compared with standards. When possible, the nature of the sediment should be described under "Remarks."

## TEMPERATURE—PERFECT SCORE, 5

POINTS		POINTS	
40 degrees F. and below.....	5	51 to 55 degrees.....	2
41 to 45 degrees.....	4	56 to 60 degrees.....	1
46 to 50 degrees.....	3	Above 60 degrees.....	0

## CONTAINER AND CLOSURE—PERFECT SCORE, 5

Make deductions in score for dirty, leaky, dented, or chipped containers; and for closures which do not cover the lips of the containers or do not fit properly in the closure seats.

NOTE.—Any sample failing to comply with the legal standard for bacteria, fat, solids not fat, or total solids shall be debarred from competition.

FIGURE 5.—Reverse side of scorecard shown on page 19.

Contestant No. \_\_\_\_\_

## Contest Milk or Cream Scorecard

Place score opposite arrow for each factor in proper sample column. Check criticism in appropriate space for each sample. Write in other criticisms if necessary. Total the scores for each sample.

PERFECT SCORE	SCORE AND CRITICISMS	Sample No.							SUMMARY	
		1	2	3	4	5	6	7		
<b>Flavor and odor—45</b> (No criticism 40-45) (Normal range 25-39)	Contestant's score									
	Official score									
	Score difference									
	Criticism difference									
	Bitter									
	Cooked									
	Coarse acid (high acid)									
	Cowy (barny)									
	Disinfectant									
	Feed									
	Flat (watery)									
	Malty									
	Metallic									
	Musty									
	Onion									
	Oxidized									
	Rancid (lipase)									
	Salty									
	Utensil (unclean)									
Weedy										
<b>Sediment—10</b> (Normal range 8 through 10)	Contestant's score									
	Official score									
	Score difference									
	Criticism difference									
<b>Container and closure—5</b> (Normal range 3 through 5)	Contestant's score									
	Official score									
	Score difference									
	Criticism difference									
	Container—unsealed									
	Container—not full									
	Container—dirty inside									
	Container—crushed, dented, bulged, soggy									
	Container leaky									
	Closure—leaky, poorly seated									
	Closure cover—torn									
	Lip chipped									
	Lip unprotected									
	Lip partly protected									
	Lip cover—non-water-proof									
	<b>Bacteria—35</b>	Contestant's score								
		Official score								
Score difference										
<b>Temperature—5</b>	Contestant's score									
	Official score									
	Score difference									
<b>Total—100</b>	Contestant's Total Score									
	Official Total Score									
		Grand Total Difference								

FIGURE 6.—Contest scorecard for milk, or cream.

# Scoring Milker Unit Head

For many years educational groups and sanitarians have focused their attention on the importance of milking machine units as a source of contamination of milk. FFA was the first to incorporate a scoring system for milking units into their National FFA Dairy Scoring Contest. A scoring guide and scorecard were developed for the evaluation of the condition and cleanliness of rubber and metal parts. This scoring system has now replaced the can and cover portion of the scorecard used in their contests. This program is doing much to point out the importance of sanitary equipment among future farmers and dairy workers.

The scoring guide is shown below:

## Milker Unit Head Parts

	Cuts:
Rubber parts—dirty or milkstone inside.....	1
Rubber parts—checked or blistered.....	1
Rubber parts—absorbed fat (weak-sticky).....	1
Rubber parts—leaky.....	1
Rubber parts—poorly fitted.....	1
Metal parts—dirty or milkstone inside.....	1
Metal parts—badly dented or damaged.....	1
Metal parts—pitted or corroded.....	1
Metal parts—open seam.....	1
Metal parts—exposed copper or brass.....	1

A combination of undesirable factors may score the milker unit head zero. Normal score on milker unit head 5 through 9.

Milker unit heads are scored as a unit and are not to be handled.

Contestants will score each item and place a check mark to right of defect.

The complete scorecard used in FFA contests is shown in Figure 7.

Milk and Milker Unit Head Scorecard

Class Name \_\_\_\_\_ Class No. \_\_\_\_\_  
Contestant Name \_\_\_\_\_ Contestant No. \_\_\_\_\_

Write scores only opposite the rating for contestant's score. Check criticism in space opposite the defect noted and in proper sample column. Do NOT write in space indicating official score, grade difference, grade on defects, rubber parts and metal parts.

PERFECT SCORE	CRITICISMS	SAMPLE NUMBER						
		1	2	3	4	5	6	7
<b>FLAVOR AND ODOR—45</b> (No criticism 40-45) (Normal range 25 through 39)	Contestant's score							
	Official score							
	Grade difference							
	Grade on defects							
	Bitter							
	Cooked							
	Cow							
	Disinfectant							
	Feed							
	Flat—watery							
	Garlic or onion							
	High acid							
	Malty							
	Metallic							
	Musty							
	Oxidized—cardboard							
	Rancid							
	Salty							
	Unclean							
	Weedy							
No Criticism								
<b>SEDIMENT-10</b> (Normal range 5 through 9)	Contestant's score							
	Official score							
	Grade difference							
<b>MILKER UNIT HEAD —10</b> (No criticism 10) (Normal range 5 through 9)	Contestant's score							
	Official score							
	Grade difference							
	Grade on defects							
	Rubber parts—							
	dirty inside or milkstone							
	checked or blistered							
	absorbed fat (weak- sticky)							
	leaky							
	poorly fitted							
	Metal parts—							
	dirty or milkstone inside							
	badly dented or damaged							
	pitted or corroded							
	open seams							
	exposed copper or brass							

**SUMMARY OF  
CONTESTANT  
GRADES BY  
TABULATORS**

Sample No.	Grade
1	
2	
3	
4	
5	
6	
7	
<b>Total Score</b>	
(perfect score is zero)	

Criticisms—A value of one point each.  
Sediment —Score sediment discs according to U.S. Department of Agriculture sedi-  
ment standards for milk and milk products.

FIGURE 7.—Milk and milker unit head scorecard.



## SUMMARY

Briefly, the principal points to observe in judging are these:

1. Be in good physical and mental condition. Avoid strong flavored foods and eating a heavy meal just before judging. Do not use strong perfumed soap or lotions.
2. Select a satisfactory room or area for judging. Have samples properly adjusted to 70° to 80° F.
3. Know the scorecard and ratings of each item.
4. Learn the classification of each defect and the evaluation of its intensity.
5. Detect the aroma as soon as possible.
6. Take into the mouth a sufficient sample for proper tasting, exhaling slowly through the nose to observe the volatile flavors.
7. Concentrate on the flavor and odor sensations and make your mental comparisons with the "ideal" and with the scorecard.
8. Avoid being too critical; do not try to find flavors that may not be present or that you imagine might be present.
9. Record the score and allow sufficient time for the mouth to become refreshed before taking the next sample.
10. Depend on your own judgment. Avoid being influenced by facial expressions or comments of others. They may be misleading.
11. Do not become discouraged; diligent practice and a lot of experience are essential to develop good judging ability. There are no short cuts.